

**T**he deregulation of the electric utility industry has heralded an increase in grid-tied PV systems on homes, due in part to the fact that consumers now find it easier to own a system that is readily accepted by the utility, and then sell the excess power they create back to the utility. Selling excess electricity generated is the premise of net metering, which several states now allow.

Programs that educate utilities with respect to PV and its successful interface with electric power lines have been increasingly visible. That, too, has promoted the acceptance of PV by utilities, which has often meant incentives offered to consumers, which translates to more utility-tied photovoltaic systems.

It is estimated that there are now at least 20 megawatts of power being generated by grid-tied PV in the United States.

The Million Solar Roofs Initiative has given PV a boost among state energy programs and the general citizenry. Initiatives such as the Sacramento Municipal Utility District's Pioneer program allow residents to purchase SMUD's rooftop systems, which are all net metered, and programs in Florida and Arizona are part of a large thrust to make PV a viable grid-tied option for homeowners.



△ This grid-tied 8.6kW PV system meets all the electric needs of this 4,500 square foot home, including the charger for the family's electric vehicle and an air conditioning system. The system, which was provided by Altair Energy, includes emergency features for covering an electric utility outage, so the family can operate key appliances for a couple of days. These Boulder, Colorado homeowners benefit from net metering. [Photo courtesy Altair Energy]



◁ Ascension Technology provided this 2kW array on a grid-connected home in the Minneapolis, Minnesota, area. The project was part of Northern States Power Company's Solar Advantage Program. [Photo courtesy Ascension Technology]

◁ Evergreen's EverSun™ ac modules (available through Real Goods Trading Company), provide power for this home. Evergreen Solar is located in Waltham, Massachusetts. [Photo courtesy Evergreen Solar]

▽ At a California PVUSA site, this roofing shingle test bed allows more successful residential grid-tied installations throughout the U.S. [Photo courtesy PVUSA]



▽ This grid-connected residence was featured in the Denver Home Builders Association's Parade of Homes. The Green Gables home by McStain features a 1.2kW Solarex Solar Energizer® system. *[Photo courtesy Solarex]*



△ This PV system consists of a 1.8 kW array of BP-275 modules, a single Trace SW4048 true sine wave inverter, and 35kWh of battery storage. The system (located in Corrales, New Mexico) is grid connected under a net metering agreement that allows the excess solar energy to be 'stored' on the grid for use when the sun is not shining. *[Photo courtesy Energia Total]*



△ Designed by Solar Design Associates of Harvard, Massachusetts, this home in Kennebunkport, Maine, is approximately 2,900 square feet and produces its own heat, hot water, and electricity from the sun. The south roof incorporates an integrated array of solar thermal collectors and large-area PV modules (4.2kW) to form a single, uniform glass plane. This building-integrated PV is utility-interactive, but could operate as a stand-alone system at any time. The house exports a surplus of power annually via a net metering connection. Modules are by ASE Americas, inverters by Trace, batteries by BP. *[Photo courtesy Solar Design Associates]*

▷ FIRST, Inc., creates homes with a buyer-ready option for choosing a solar power alternative, meaning no retrofit costs. (AvisAmerica was selected by FIRST to supply these factory-built, modular, all-solar homes.) There is every indication that more building-integrated PV will take place, making design and building activities more compatible with PV. *[Photo courtesy FIRST, Inc.]*

▷ Homes with PV included as part of the total purchase price are beginning to be chosen by new home buyers. Two subdivisions that offer such an option are the Reflections at Mace Ranch (Davis, California) and Prodigy Homes (Elk Grove, California), both of which are constructed with Sunslates as upgrades. Sunslates is a product provided by Atlantis Energy of Sacramento. *[Photo courtesy Atlantis Energy]*







△ Bonny Doon, near Santa Cruz, California. Although this home is grid-tied, the location is remote enough that they lose power fairly often during winter storms, making a battery back-up system perfect for them. The array features 24 AstroPower 1106 V modules (1,120W ac), a Trace SW 4048 inverter, and four flooded Trojan batteries. The installation, provided by Pacific Solar Company of Redwood City, California, provides most, but not all, of their electrical needs. *[Photo courtesy Pacific Solar Company]*

▽ This roof-mounted 10kW system powers a single residence overlooking the Pacific Ocean. Concorde sealed batteries and two Trace SW5548 inverters accompany 96 AstroPower 1206 modules, designed and installed by Pacific Solar Company. *[Photo courtesy Pacific Solar Company]*



△ This solar-shingled home is one of Sacramento Municipal Utility District's customer-owners—part of their PV Pioneers Program—and operates in conjunction with SMUD's solar power plant near Rancho Seco, California. SMUD's PV Pioneer II program offers homeowners the opportunity to purchase rooftop PV units, each of which is net metered. *[Photo courtesy SMUD]*

▷ A 2kW grid-tied residential rooftop system in Fairfield, California. *[Photo courtesy BP Solar]*





◁ This 7,000 square foot Evergreen, Colorado home features a 2.4kW solar electric ground-mounted back-up system. The system supplies about one-fourth of the family's electric needs and provides back-up power to the well pump, heat circulation pump, refrigerator, computer, selected lights, and the security system, in the event of a utility power outage. *[Photo courtesy Altair Energy]*



◁ The Florida Solar Energy Center and a Lakeland, Florida homebuilder partnered to build and monitor this home, which demonstrates that energy efficient strategies significantly decrease a building's energy load and increase the value of a building's PV system. Photovoltaics, when installed in homes that have already been modified to take advantage of other energy-efficient options, can offset a large percentage of a homeowner's electrical loads. This 4kW PV system over-cools with day time solar energy, avoiding the early evening peak-utility use. *[Photo courtesy Florida Solar Energy Center]*



△ Although 20 years passed after Tucson's solar village was first announced, Civano, a planned energy-efficient community, is now a reality. Every Civano home is at least 50 percent more efficient than the model energy code, and nearly a dozen of the 17 model homes built to date have photovoltaic systems on the roofs. *[Photo courtesy Tucson Coalition for Solar]*

▽ Some homeowners choose to have their photovoltaic system installed as an awning or patio cover, thereby alleviating the need for a roof-mounted system, while providing a desirable shaded area. *[Photo courtesy Bill Brooks]*

